

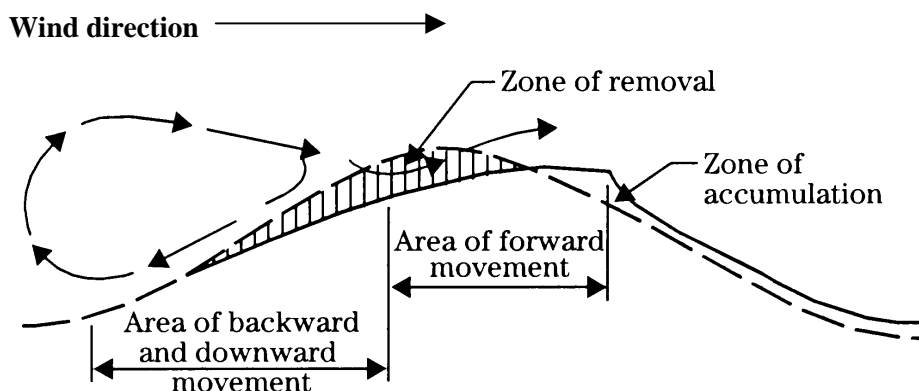
**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATIONS**

**CROSS WIND RIDGES
(ACRE)**

CODE 589A

GENERAL SPECIFICATIONS:

The following specification is provided as general guidance to ensure proper implementation of this practice to meet planned objective. The area of erosion and deposition of a ridge is illustrated by the following drawing:



Ridges shall be established and maintained using normal tillage and planting equipment such as chisel plows, listers, drills with hoe openers, or other similar implements. Ridges will be constructed according to designed height, spacing and direction. **Krd** is the value of ridge roughness expressed as a decimal fraction. Example, a **Krd** of 0.75 indicates that 25% of the erosion is reduced because of cross wind ridging. **Kr** is the old factor of the same thing. Larry Hagen, ARS in 1996 added more adjustments to **Kr**, to give us the **Krd**.

Ridge Roughness (**Krd**) equal to 0.8 or less will be designed using the procedure in this specification. **Krd** less than 0.8 is not cross wind ridging. **Krd** is read from one of five graphs listed in the Exhibit 502-4 of the National Agronomy Manual (NAM) or calculated using the NM Cross Wind Ridging Jobsheet. The graphs are included in this specification. **Krd** is read from the graphs using **Kr** (old ridge roughness), the I of the soil, and the angle of the wind deviation from perpendicular (0, 22.5, 45, 67.5, or 90 degrees of perpendicular). Figure 9 illustrates how wind deviation is measured. The wind preponderance is used in the excel spreadsheet NM Cross Wind Ridging Jobsheet (electronic version of the design). Both the hand method and the electronic version give approved results. The hand method does not correct for preponderance.

Kr is calculated using the formula: $Kr = 4(h^2)/s$ (Equation 1)

Where: **h** = ridge height in inches and **s** = ridge spacing (inches)

This calculation is made for the user when the NM Cross Wind Ridges Jobsheet is used.

Pages 502-27 to 502-31 of the NAM (graphs), attached, allows the user to find the correct **Krd** needed based on the **Kr**, the angle of deviation, and the Soil Erodibility Index (I) value.

The angle of deviation is illustrated by the following (figure 9):

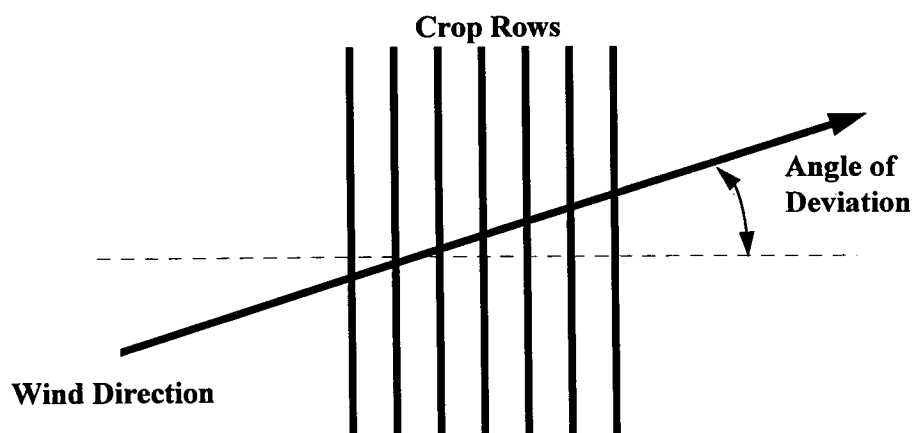


Figure 9. Illustration of Angle of Deviation

Preponderance (Table 1) is needed to adjust the weighting that the ridges have. The preponderance can be determined by finding the climate station closest to the field and the month that the protection is needed. The value is used on the NM Cross Wind Ridges Jobsheet.

Table 1 Preponderance for NM from the NAM June 2000

Location	Preponderance for NM											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NM, ALAMOGORDO	1.5	1.2	1.6	1.9	1.4	1.8	1.7	2.1	3.5	2.7	1.4	1.3
NM, ALBUQUERQUE	2.2	2.1	1.9	1.5	1.5	2	3.4	2.5	3.3	2.8	2.3	2.4
NM, CARLSBAD	4	4	4	4	1.9	1.1	1.8	1.6	2.5	1.9	4	4
NM, CLOVIS	2.1	2.2	1.8	1.8	1.8	1.8	2.3	2.3	2.5	2.5	1.5	1.9
NM, COLUMBUS	2.5	2.6	2.7	2	2.2	2.3	1.7	3	2.5	1.7	2.3	1.9
NM, FARMINGTON	3.9	3.5	3.7	2.5	1.1	2	2	1.6	3.2	1.6	3.1	3.6
NM, GALLUP	3.5	3.1	3	2.8	2.4	2.9	1.7	2	3.1	2.8	2.9	4
NM, HOBBS	2.3	1.6	2	2.8	1.2	1.9	2	1.5	1.9	3.1	1.3	1.8
NM, LAS CRUCES	4	4	4	4	4	1.2	1.1	2.8	4	3.3	4	4
NM, LAS VAGAS	3.2	2.8	2.6	2.5	2.7	3.5	1.5	2.1	2.5	2.8	2	1.9
NM, RATON/CREWS	2.6	1.3	1.2	1.8	1.7	2	1.7	2.2	2.7	2.4	1.7	2.5
NM, ROSWELL	3.7	2.4	1.9	2.4	1.1	1.5	1	1.6	2.2	1.2	1.8	3
NM, SANTA FE	1.1	1.2	2.3	2	1.4	1.4	1.2	1.7	1.1	1.2	1.4	1.1
NM, T OR C	1.2	1.5	2.1	1.9	2.7	2.7	1.5	1.6	3.8	4	3.6	2
NM, TUCUMCARI	2	1.9	2.2	1.8	1.8	1.6	2.4	2.7	2.9	2.7	2.3	2.3
NM, ZUNI	4	4	4	3.8	4	4	2.3	1.1	4	3	3.6	4
NM,OTTO	2.2	2.4	3	1.6	2.1	3.3	2.7	3.9	1.4	1.3	2.3	2.2

DESIGN PROCEDURE:**Hand Procedure**

Step 1 Determine the Angle of Deviation for the field (0, 22.5, 45, 67.5, or 90 degrees of perpendicular). See Figure 9.

Step 2 Calculate the **Kr** using equation 1 (see above)

Step 3 With the field soil I value, angle of deviation, and Kr find the correct **Krd** graph. Enter the bottom of the graph with the **Kr** go up to the correct soil I value and over to the corresponding **Krd**. If the Krd is equal to or less than .0.8 then the ridges height and spacing are enough to meet the standard. If not then, try higher ridges or closer spacing to get to 0.8 or less.

Example

An irrigated cotton farmer near Lovington wants to control wind erosion on his dryland circle corners coming out of cotton. He tills the land north and south and the damaging wind is expected from southwest in March. The soil is a sandy loam with an I of 134. Most of the farm equipment has a 38-inch spacing. The lister will make 6 inch high ridges. What height do the ridges need to be to meet this Specification? Is 6 inches enough?

Hand Version

Try the lister to see if it is OK.

Step 1: Since the wind blows out of the SW and the tillage is done North and South use 45 degrees as the angle of deviation.

Step 2: Calculate the **Kr**. $Kr = 4(6^2)/38$ **Kr** = 3.8

Step 3: Using the I of 134, the **Kr** of 3.8 and the angle of deviation of 45 degrees, find the correct graph (third graph). Enter the graph with the **Kr** of 3.8, go up to the I of 134 and find **Krd** of .53. Note that a **Kr** as low as 1.0 would meet the **Krd** of 0.8. The lister would be OK to do the ridging. The 0.53 gives some extra protection and allows for some reduction of height before the field would need to be listed again. **Answer, Krd = 0.53 design is OK.**

Spreadsheet Version (Light yellow boxes require an entry)

Step 1: Since the wind blows out of the SW and the tillage is done North and South use 45 degrees as the angle of deviation.

Step 2: Enter the soil I value 134, the ridge Ht of 6 inches, the spacing of 38, preponderance of 2 from the Hobbs Location (Table 1), and the angle of deviation of 45 degrees. Note that the computer show a **Krd** of 0.52. **Answer, Krd = 0.52 design is OK.**

OPERATION AND MAINTENANCE:

After establishment, ridges shall be maintained through those periods when wind erosion is expected to occur, or until growing crops provide enough cover to protect the soil from wind erosion.

If ridges deteriorate and become ineffective due to weathering or erosion, they shall be re-established unless doing so would damage a growing crop.

Ridges shall be re-established by normal tillage and planting equipment such as chisel plows, drills with hoe openers, or other similar implements which form effective ridges.

Krd Tables from the NAM June 2000

